

When Good Plans Go Bad

Forest Service Fire and Aviation Management: Toward Doctrine and Risk Management

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The US Forest Service has been actively engaged in the management of wildland fire for more than a century. Few environments are more perilous than wildlands on fire. More than 1000 people have lost their lives fighting wildfire since record-keeping began early in the 20th Century. Unfortunately, we now face a wildfire environment that is becoming more dangerous and more complex, where economic, political, and human risk factors have sky-rocketed. We are increasingly challenged by vast landscapes of flammable fuels and the presence millions of people—and their vast infrastructure—in the midst of it all. Managing wildfire, which is inherently dangerous, within this environment of escalating complexity puts 21st Century firefighters at historic risk.

Past approaches to wildfire management favored over-whelming mass: The Forest Service sent as many firefighters as possible to the fireline with hand tools and little else. Communications were primitive and fire intelligence limited to the observable. Consequently, the exposure of firefighters to risk was extraordinary. Firefighting tools have improved over the last century, and the improvements are important: Air support, communications, personal protective equipment, and the development of the incident command system have moved us toward better outcomes. At the same time, however, the growing complexity of the wildfire environment continues to increase the exposure of firefighters to new and greater risks.

Recent developments in the wildland fire community in thinking and science-based technology are arresting this trend. Principles of wildfire management Doctrine and practical decision support science are integrating disparate streams of human judgment and relevant science to minimize exposure to risk. Increasingly, firefighters can fight fire more safely with improved speed, agility, and focus.

In the wildland firefighting community, the years surrounding the turn of the 21st Century were difficult. Thirty four lives were lost in 1994 alone. In 2006, Forest Service Fire and Aviation Management formally adopted the capstone of numerous policy and programmatic reviews that followed the 1994 fire season: *Doctrine* would systematically promote a learning culture within fire management guided by well-stated principles that reflect the reality of the work, the wild land environment, and the mission. Doctrine incorporates principles that form the foundation of human judgment, decisions, action, and behavior. It is authoritative but flexible, definitive enough to guide specific operations, yet adaptable enough to address diverse situations. Far from eliminating firefighters' standard rules of engagement, Doctrine empowers people to use their own judgment "at the sharp point of the spear" where accidents most often occur. The Forest Service established the Branch of Risk Management, Human Performance and Development to seek new ways to anchor safety within an organization mindset focused on risk management and human factors principles.

Key to the implementation of Doctrine in the high-risk wildfire environment is the development of science-based technology that supports real-time decision-making. Much of the science and

many of these tools were developed by Forest Service scientists following decades of research and development. The focal point of the science effort is currently housed within the National Fire Decision Support Center (NFDSC), a collaborative effort between Forest Service Fire and Aviation Management and Forest Service Research and Development. The NFDSC provides a link between the development of wildland fire science and its real-time application.

The most important new decision support tool to reach the field is the Wildland Fire Decision Support System (WFDSS). WFDSS includes an amalgam of existing decision support tools that provided discrete information and data streams to fire managers. WFDSS replaces and consolidates these tools into a single process that is intuitive and easy to use. Decision makers at all levels can use WFDSS to plan, manage, and support decision-making on any wildland fire; fire size, objectives, agency direction, fuel types and conditions, social setting, and availability of firefighting assets are built into the decision support process. WFDSS is web-based, adaptable to diverse situations, and accessible to fire managers in real-time. Through WFDSS, managers can immediately access weather analyses and tools that predict fire behavior and possible fire spread pathways and size. Economic assessment tools describe local values at risk and fire cost estimates. Most importantly, the suite of science-based information allows fire managers and firefighters to manage risk, informed by both technology and Doctrine.

The nation still needs wildland firefighters. They, the so-called boots-on-the-ground, control wildfires—not airtankers, helicopters, or engines. To manage firefighters' exposure to risk and make better risk-informed decisions, wildland fire agencies are making increasing use of the science-based decision support tools and relying on firefighters' decisions informed by Doctrine. The Forest Service is pleased that for the past two years, the agency has experienced no ground operations fatalities, and that there were no fire-related fatalities in either ground or aviation operations in 2010. The growing consensus among wildland fire managers is that the emphasis on Doctrine and risk management through science-based technology contributes significantly to the Forest Service's ability to operate more safely and successfully in the high risk environment of wildland fire.